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(71)Applicant : ALPS ELECTRIC CO LTD

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(72)Inventor : MAEDA RYOICHI

KANAO KAZUO

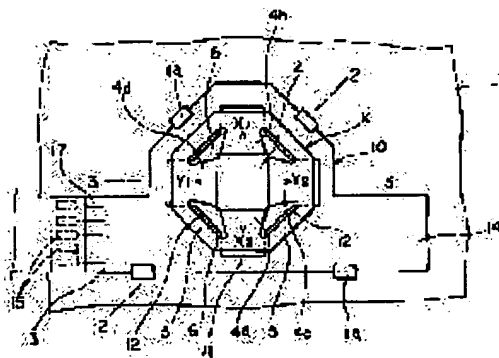
AKAHAMA TAKESHI

(54) INPUT DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To make an input device possible to enlarge the amount of deflection of a beam part, to enlarge the amount of change of a distortion detection element, and to attain improvement of the operability by installing a substrate member in a state in which the beam part is positioned at a recessed part of an installation member and a gap is given to a lower part of the beam part.

SOLUTION: A substrate member K, in which a connection part 5 is mounted on a reception part 12 of an installation member 10, solders a conductive material and an electrode part are soldered, is installed to the installation member 10. Then, when the substrate member K is installed, beam parts 4a, 4b, 4c and 4d are positioned at a recessed part 11 and are in a state in which a gap is given to lower parts of the beam parts 4a, 4b, 4c and 4d. Therefore, an amount of deflection of the beam parts 4a, 4b, 4c and 4d by an operation part 2 becomes large. Also, a distortion detection element is in a state in which is it pulled out to a pullout terminal part 15 through a connection line 17 by connection/adhesion by solder of the conductive material and the electrode part. A flexible substrate performs pulling out to outside of an input device by soldering a conductive line to the pullout terminal part 15.



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(71) 出願人 000010098

アルプス電気株式会社

東京都大田区雪谷大塚町1番7号

(72) 発明者 前田 良一

東京都大田区雪谷大塚町1番7号 アルプス電気株式会社内

(72) 発明者 金尾 一雄

東京都大田区雪谷大塚町1番7号 アルプス電気株式会社内

(72) 発明者 赤濱 武志

東京都大田区雪谷大塚町1番7号 アルプス電気株式会社内

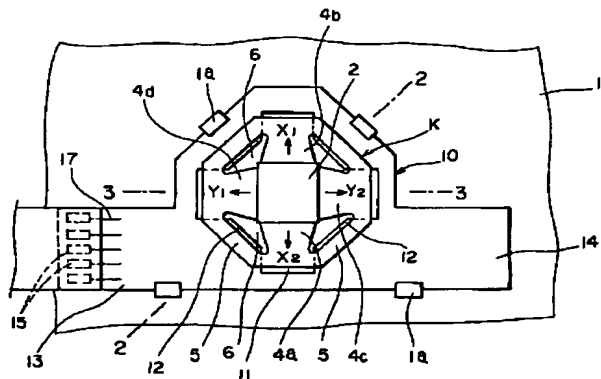
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(54) 【発明の名称】 入力装置

(57) 【要約】

【課題】 従来の入力装置は、操作部材51の基部51b、51c、51dの下面全面が枠体50に当接、載置されるため、基部51b、51cの撓み量が少なく、操作性が悪いという問題がある。

【解決手段】 本発明の入力装置において、基板部材Kは、梁部7a~7dが取付部材10の窪み部11に位置し、梁部7a~7dの下部に空隙を持たせた状態で取り付けようとした構成であるため、操作部2による梁部4a~4dの撓み量を大きくでき、歪み検出素子7a~7dの変化量を大きくでき、操作性の良好な入力装置を提供できる。



歪み検出素子53と54の抵抗値変化に大きなズレが生じ、精度の良好なものが得られないという問題がある。また、基部51b、51c、51dの下面全面が枠体50に取り付けられるため、キーボードのキーを操作した時、キー操作が基部51b、51c、51dに影響して、カーソルが動くという問題がある。また、基部51bと51cは、操作部51aの根本部分が互いに繋ぎ部51eで繋がった構成であるため、操作部51aをX1、X2方向に倒した時には、繋ぎ部51eを介して基部51cに、また、操作部51aをY1、Y2方向に倒した時には、繋ぎ部51eを介して基部51bに影響を受け、これによって、抵抗値の変化を必要としない相手の歪み検出素子に、大きな抵抗値変化を生じるという問題がある。

【0006】

【課題を解決するための手段】上記課題を解決するための第1の解決手段として、操作部と、中心部に前記操作部が取り付けられた平板状の基板部材と、該基板部材に設置された歪み検出素子と、前記基板部材を取り付ける平板状の取付部材とを備え、前記基板部材は、前記操作部の軸線に対して直角方向に延び、90度の角度を持って配設された複数の梁部と、隣り合う前記梁部間を連結する連結部とを有し、前記梁部には前記歪み検出素子が配設され、又、前記取付部材には、前記連結部に対応した位置に受け部を残して、前記梁部に対応する位置に孔、或いは凹部からなる窪み部を設け、前記梁部を前記窪み部に位置させて、前記梁部の下部に空隙を持たせた状態で、前記連結部を前記受け部に固着した構成とした。また、第2の解決手段として、前記梁部を十字状に配設した構成とした。また、第3の解決手段として、前記基板部材には、隣り合う前記梁部と前記連結部との間で囲まれた箇所に孔を設けた構成とした。また、第4の解決手段として、前記基板部材をセラミック材で形成し、前記基板部材の下部に設けた導電体と前記取付部材とを半田付で固着した構成とした。また、第5の解決手段として、前記基板部材、及び取付部材を金属板で形成し、前記基板部材と前記取付部材とをスポット溶接で固着した構成とした。また、第6の解決手段として、前記基板部材をセラミック材で形成すると共に、前記基板部材の下部に導電線を有するフレキシブル基板を配設し、前記基板部材の下面に設けた前記歪み検出素子に前記導電線を接続した状態で、前記フレキシブル基板を前記基板部材と前記取付部材とで挟持した構成とした。また、第7の解決手段として、前記取付部材の前記受け部に折り曲げ可能な押さえ部を設け、該押さえ部により前記基板部材の連結部を、前記受け部において固着した構成とした。また、第8の解決手段として、前記取付部材の前記受け部にハトメ部を設け、該ハトメ部により前記基板部材の連結部を、前記受け部において固着した構成とした。

【0007】

【発明の実施の形態】次に、本発明の入力装置の第1の実施例を図1～図5に基づいて説明すると、何れも本発明の第1の実施例の入力装置に係り、図1はその平面図、図2は図1の2-2線における断面図、図3は図1の3-3線における断面図、図4はその分解斜視図、図5は基板部材を裏面から見た斜視図である。

【0008】本発明の歪み検出素子を用いた入力装置を図1～図5に基づいて説明すると、比較的板厚の厚い金属板からなり、キーボードの枠体等を構成する取付板1は、切り起こされた複数の折り曲げ可能な舌片1aを設けている。合成樹脂、或いはガラス繊維入りの合成樹脂（変性ポリフエニレンエーテル等）の成型品からなる柔軟性を有する操作部2は、角柱状、或いは円柱状等の棒状、或いは筒状で構成されている。八角状のセラミック材からなる基板部材Kは、図4、図5に示すように、中心部に設けられた取付部3と、この取付部3から90度の角度で十字状に延びる複数の梁部4a、4b、4c、4dと、この梁部4a、4b、4c、4dの隣り合うそれぞれの他端に連結された連結部5と、取付部3の隅部に設けられ、隣り合う梁部4a、4b、4c、4dと連結部5との間に囲まれた箇所に、梁部4a、4b、4c、4d間を分離する三角状の孔6とを有している。そして、基板部材Kの取付部3には、操作部2の下部が接着剤等により固着され、その結果、梁部4a、4b、4c、4dは、操作軸3の軸線に対して直角方向に延びたものとなっている。

【0009】また、操作部2は、図1に示すように、矢印X1、X2、及びY1、Y2方向に倒すことができ、この倒れに基づいて、基板部材Kの梁部4a、4b、4c、4dは撓んで、その下面側が延びたり縮んだりするようになると共に、梁部4a、4b、4c、4d間に設けた孔6の存在により、操作部2を倒した時、隣り合う梁部が互いに影響を受けることなく、それぞれの梁部が撓むことができるようになっている。また、各梁部4a、4b、4c、4dの下面には、サーメット抵抗体等からなる歪み検出素子7a、7b、7c、7dが形成されると共に、各連結部5の下面には、半田付可能な導電性の導電体8が形成されており、ここでは図示していないが、各歪み検出素子7a、7b、7c、7dの両端部と導電体8とが銀ペーストなどからなる導電線（図示せず）で接続されている。なお、上記実施例では、4個の歪み検出素子7a、7b、7c、7dを使用したもので説明したが、2個の歪み検出素子7a、7cを用いるものでも良い。そして、図3に示すように、導電体8を除いて、歪み検出素子7a、7b、7c、7dと導電線が絶縁性のレジスト9により被覆された構成となっている。

【0010】また、金属板からなる平板状の取付部材10は、特に図4に示すように、中心部に設けられた十字

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状の孔、或いは凹部等からなる窪み部11と、隣り合う窪み部11間に位置する受け部12と、外方に延出した延出部13とを有する。即ち、取付部材10には、受け部12を残して孔、或いは凹部からなる窪み部11が設けられた構成となっている。また、取付部材10の上面の表面には、絶縁層14が形成され、この絶縁層14上には、延出部13の端部上に位置し、導電材からなる複数個の引き出し端子部15と、受け部12上に位置し、導電材からなる電極部16と、この電極部16と引き出し端子部15とを接続する接続線17とが形成されている。

【0011】そして、基板部材Kは、連結部5を取付部材10の受け部12上に載置すると共に、導電体8と電極部16とをクリーム半田等により半田付けされて、基板部材Kが取付部材10に取り付けられている。そして、基板部材Kが取り付けられた際、梁部4a、4b、4c、4dは、窪み部11に位置して、梁部4a、4b、4c、4dの下部に空隙を持たせた状態となっていて、操作部2による梁部4a、4b、4c、4dの撓み量が大きくなると共に、導電体8と電極部16の半田による接続・固着により、歪み検出素子7a、7b、7c、7dは、接続線17を介して引き出し端子部15に引き出され状態となっている。また、フレキシブル基板18は、その下部に導電線（図示せず）を有し、この導電線を引き出し端子部15に半田付することにより、入力装置外への引き出しを行うようになっている。そして、このように構成された入力装置は、図1～図3に示すように、取付部材10をキーボードの取付板1上に載置し、舌片1aを取付部材10上に折り曲げて、舌片1aで取付板1に取り付けられている。なお、この第1の実施例において、取付部材10は取付板1を兼用するようにしても良い。

【0012】そして、このような入力装置の操作は、操作部2をX1方向に倒すと、梁部4aの下面は縮む方向に撓むと共に、梁部4bの下面は伸びる方向に撓むため、梁部4aの下面の歪み検出素子7aの抵抗値は減少する反面、梁部4bの下面の歪み検出素子7bの抵抗値は増加し、更に、操作部2をX2方向に倒すと、梁部4aの下面は伸びる方向に撓むと共に、梁部4bの下面は縮む方向に撓むため、梁部4aの下面の歪み検出素子7aの抵抗値は増加する反面、梁部4bの下面の歪み検出素子7bの抵抗値は減少し、これによって、歪み検出素子7aと7bとの間に電圧差が生じて、X軸方向のカーソルの移動を行うようになる。

【0013】また、操作部2をY1方向に倒すと、梁部4cの下面は縮む方向に撓むと共に、梁部4dの下面は伸びる方向に撓むため、梁部4cの下面の歪み検出素子7cの抵抗値は減少する反面、梁部4dの下面の歪み検出素子7dの抵抗値は増加し、更に、操作部2をY2方向に倒すと、梁部4cの下面は伸びる方向に撓むと共

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に、梁部4dの下面は縮む方向に撓むため、梁部4cの下面の歪み検出素子7cの抵抗値は増加する反面、梁部4dの下面の歪み検出素子7dの抵抗値は減少し、これによって、歪み検出素子7cと7dとの間に電圧差が生じて、Y軸方向のカーソルの移動を行うようになる。

【0014】また、図6は本発明の入力装置の第3の実施例を示し、この実施例は、基板部材Kが金属板で形成され、この基板部材Kの表面には、絶縁層19が形成されており、この絶縁層19上には、梁部4a、4b、4c、4dの位置にそれぞれ形成された歪み検出素子7a、7b、7c、7dと、引き出し部20の位置に形成された複数個の引き出し端子部21と、引き出し端子部20と歪み検出素子7a、7b、7c、7dを接続するように形成された導電線22とを有している。また、操作部2が取付部3の孔3aに固着されると共に、基板部材Kの連結部5が取付部材10の受け部12に載置された状態で、連結部12と取付部材10をスポット溶接により固着している。また、フレキシブル基板18は、その下部に導電線（図示せず）を有し、この導電線を引き出し端子部21に半田付することにより、入力装置外への引き出しを行うようになっている。その他の構成は、前記第1の実施例と同様であるので、同一部品に同一番号を付し、ここではその説明を省略する。なお、この第2の実施例においても、取付部材10は取付板1を兼用するようにしても良い。

【0015】また、図7は本発明の第3の実施例を示し、この実施例は、セラミック材からなる基板部材Kの梁部4a、4b、4c、4dの下面にそれぞれ歪み検出素子7a、7b、7c、7dを設け、また、フレキシブル基板23に設けた導電線（図示せず）を歪み検出素子7a、7b、7c、7dに接続した状態で、このフレキシブル基板23を基板部材Kの下面に接着して、フレキシブル基板23を引き出し部となしている。また、金属板からなる取付部材10には、受け部12の端部で折り曲げられた押さえ部24が設けられ、基板部材Kの連結部5を受け部12上に載置した状態で、フレキシブル基板23に設けられた三角状の孔23aと基板部材Kの孔6に押さえ部24を挿通し、押さえ部24を折り曲げして、押さえ部24で連結部5を取付部材10に押し付けて、基板部材Kを取付部材10に取り付けたものである。その他の構成は、前記第1の実施例と同様であるので、同一部品に同一番号を付し、ここではその説明を省略する。なお、この第3の実施例においても、取付部材10は取付板1を兼用するようにしても良い。

【0016】また、図8、図9は本発明の第4の実施例を示し、この実施例は、前記第3の実施例と同様に、セラミック材からなる基板部材Kの梁部4a、4b、4c、4dの下面にそれぞれ歪み検出素子7a、7b、7c、7dを設けると共に、フレキシブル基板23に設けた導電線（図示せず）を歪み検出素子7a、7b、7

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c、7 dに接続した状態で、このフレキシブル基板23を基板部材Kの下面に接着して、フレキシブル基板23を引き出し部となしている。また、金属板からなる取付部材10には、受け部12に絞り加工によりハトメ部25が設けられ、基板部材Kの連結部5を受け部12上に載置した状態で、フレキシブル基板23に設けられた丸形の孔23aと基板部材Kの連結部5に設けられた孔5aにハトメ部25を挿通し、ハトメ部25の先端部をカシメて、ハトメ部25で連結部5を取付部材10に押し付けて、基板部材Kを取付部材10に取り付けたものである。その他の構成は、前記第1の実施例と同様であるので、同一部品に同一番号を付し、ここではその説明を省略する。なお、この第4の実施例においても、取付部材10は取付板1を兼用するようにしても良い。

【0017】

【発明の効果】本発明の入力装置において、基板部材Kは、梁部7a～7dが取付部材10の窪み部11に位置し、梁部7a～7dの下部に空隙を持たせた状態で取り付けるようにした構成であるため、操作部2による梁部4a～4dの撓み量を大きくできて、歪み検出素子7a～7dの変化量を大きくでき、操作性の良好な入力装置を提供できる。また、梁部7a～7dの下部に空隙があるため、キーボードを操作した時のキー操作が梁部7a～7dに影響されず、キー操作時にカーソルが動くとのない入力装置を提供できる。また、基板部材Kの連結部5が取付部材10の受け部12に固着される構成であるため、基板部材Kの取付位置を一定にでき、操作部2を所定角度を倒したときにおける歪み検出素子7a～7dの抵抗値変化を一定にでき、従来に比して、精度の良好な入力装置を提供できる。また、梁部4a～4dを十字

【0018】また、基板部材Kには、隣り合う梁部4a～4dと連結部5との間で囲まれた箇所に孔6を設けものであるため、この梁部4a～4dの上面に歪み検出素子7a～7dが孔6の存在によって、操作部2をX1、X2方向に倒した時には、梁部4c、4dに、また、Y1、Y2方向に倒した時には梁部4a、4bに影響を与えず、従って、変化させたい歪み検出素子のみの抵抗値を変化させることができ、精度の良好な入力装置を提供できる。また、基板部材Kをセラミック材で形成し、基板部材Kの下部に設けた導電体8を取付部材10に半田付することにより、基板部材Kの取付と電気的接続を同時にできて、生産性が良好で、安価な入力装置を提供できる。また、基板部材Kと取付部材10とを金属板で形成し、両者をスポット溶接で固着することにより、強

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固な取付ができて、耐久性が良く、長寿命の入力装置を提供できる。

【0019】また、フレキシブル基板23を基板部材Kと取付部材10とで挟持するようにしたため、フレキシブル基板23の取付が強固となり、外部接続時におけるフレキシブル基板23の剥がれが無く、外部接続作業の信頼性の高い入力装置を提供できる。また、取付部材10の受け部12に設けた押さえ部24で、基板部材Kの連結部6を押さえるようにしたため、その構成が簡単で、安価で、生産性の良好な入力装置を提供できる。また、取付部材10の受け部12に設けたハトメ部25で、基板部材Kの連結部6を押さえるようにしたため、その構成が簡単で、安価で、生産性の良好な入力装置を提供できる。

【図面の簡単な説明】

【図1】本発明の入力装置の第1の実施例に係る平面図。

【図2】図1の2-2線における断面図。

【図3】図1の3-3線における断面図。

【図4】本発明の入力装置の第1の実施例に係る分解斜視図。

【図5】本発明の入力装置の第1の実施例に係る基板部材を裏面から見た斜視図。

【図6】本発明の入力装置の第2の実施例を示す分解斜視図。

【図7】本発明の入力装置の第3の実施例を示す分解斜視図。

【図8】本発明の入力装置の第4の実施例を示す分解斜視図。

【図9】図8の9-9線における断面図。

【図10】従来の入力装置の斜視図。

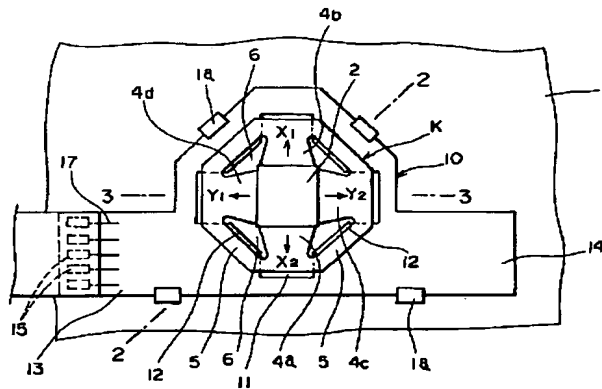
【符号の説明】

- 1 取付板
- 1a 舌片
- 2 操作部
- K 基板部材
- 3 取付部
- 3a 孔
- 4a 梁部
- 4b 梁部
- 4c 梁部
- 4d 梁部
- 5 連結部
- 5a 孔
- 6 孔
- 7a 歪み検出素子
- 7b 歪み検出素子
- 7c 歪み検出素子
- 7d 歪み検出素子
- 8 導電体

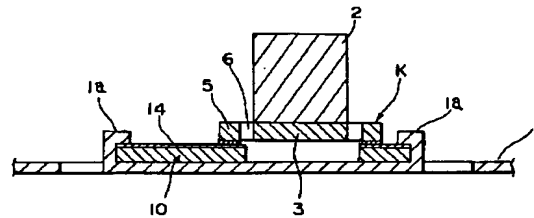
- 9 レジスト
 10 取付部材
 11 窪み部
 12 受け部
 13 延出部
 14 絶縁層
 15 引き出し端子部
 16 電極部
 17 接続部

- 18 フレキシブル基板
 19 絶縁層
 20 引き出し部
 21 引き出し端子部
 22 導電線
 23 フレキシブル基板
 23a 孔
 24 押さえ部
 25 ハトメ部

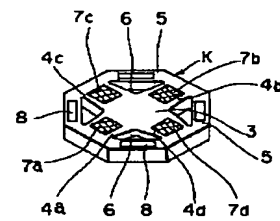
【図1】



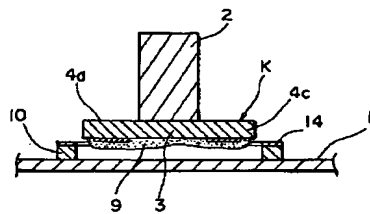
【図2】



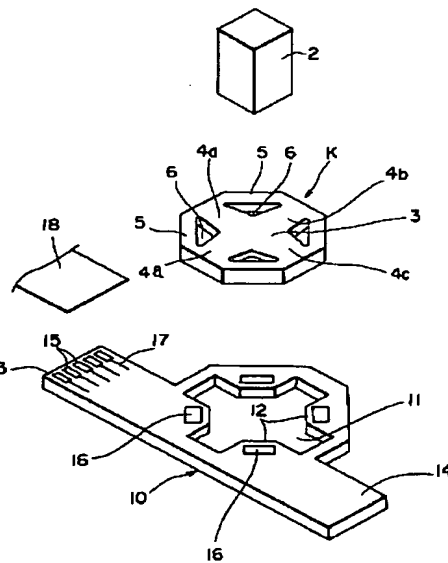
【図5】



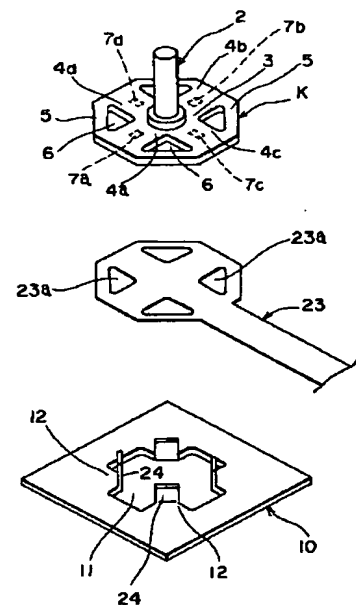
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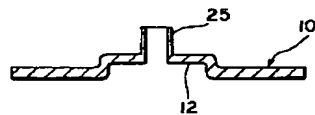
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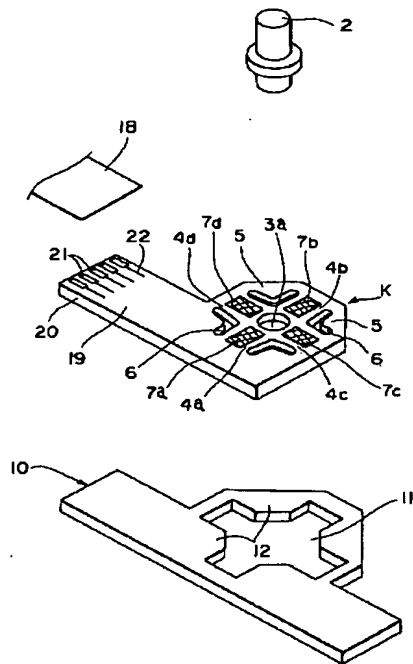
【図7】



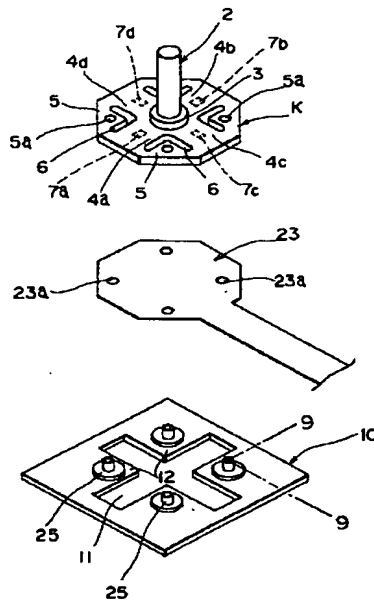
【図9】



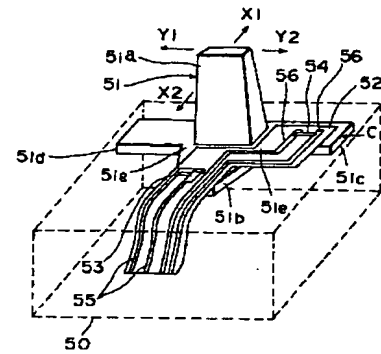
【図6】



【図8】



【図10】



フロントページの続き

Fターム(参考) 2F051 AA21 AB06 AC01 DA01 DB05
5B087 AA09 AB02 BC02 BC12 BC19
BC22 DD03

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CLAIMS

[Claim(s)]

[Claim 1] A control unit and the plate-like substrate member by which said control unit was attached in the core, It has the distortion sensing element installed in this substrate member, and the plate-like mounting member which attaches said substrate member. Said substrate member Two or more beam sections which were prolonged in the direction of a right angle to the axis of said control unit, and were arranged with the include angle of 90 degrees, It has the connection section which connects between said adjacent ****, and said distortion sensing element is arranged in said ****. To said mounting member The input unit characterized by fixing said connection section in said receptacle section where received in the location corresponding to said connection section, left the section, it prepared a hole or the hollow section which consists of a crevice in the location corresponding to said ****, it located said **** in said hollow section and an opening is given to the lower part of said ****.

[Claim 2] The input unit according to claim 1 characterized by arranging said **** in the shape of a cross joint.

[Claim 3] Claim 1 characterized by preparing a hole in the part surrounded between said **** which adjoins said substrate member, and said connection section, or an input unit given in two.

[Claim 4] An input unit claim 1 characterized by fixing the conductor which formed said substrate member by ceramic material, and was prepared in the lower part of said substrate member, and said mounting member by soldering, 2, or given in three.

[Claim 5] An input unit claim 1 characterized by having formed said substrate member and the mounting member with the metal plate, and fixing said substrate member and said mounting member by spot welding, 2, or given in three.

[Claim 6] An input unit claim 1 characterized by pinching said flexible

substrate by said substrate member and said mounting member where said electric conduction line is connected to said distortion sensing element which arranged the flexible substrate which has an electric conduction line in the lower part of said substrate member, and was prepared in the underside of said substrate member, while forming said substrate member by ceramic material, 2, or given in three.

[Claim 7] An input unit claim 1 characterized by having prepared the bendable presser-foot section in said receptacle section of said mounting member, and fixing the connection section of said substrate member in said receptacle section by this presser-foot section, 2, 3, or given in six.

[Claim 8] An input unit claim 1 characterized by having prepared the eyelet section in said receptacle section of said mounting member, and fixing the connection section of said substrate member in said receptacle section by this eyelet section, 2, 3, or given in six.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the input unit using the distortion sensing element used for a computer etc.

[0002]

[Description of the Prior Art] The operating member 51 which the input unit using the conventional distortion sensing element becomes from the synthetic resin which has flexibility as shown in drawing 10 Control unit 51a of a prism mold, and three tabular bases 51b, 51c, and 51d mutually extended from the lower part of control unit 51a to a radial with the include angle of 90 degrees, It has connector section 51e which

connects three tabular bases 51b, 51c, and 51d in the lower part of control unit 51a. This operating member 51 Where Bases 51b and 51c and whole 51d underside surface were contacted by the frame 50 of the keyboard used for a computer and are laid in it, a Bases [51b, 51c, and 51d] point is forced with a frame 50, and is attached. And when this operating member 51 pushes down control unit 51a on X1, X 2-way and Y1, and Y 2-way, Bases 51b, 51c, and 51d bend, according to the amount of derrick downs of control unit 51a, it becomes large or this amount of bending becomes small, respectively.

[0003] Moreover, it connects with two distortion sensing elements 53 and 54 which consist of resistors, and distortion sensing elements 53 and 54, and the lead wire 55 and 56 which printed the electric conduction ink of a silver system and was formed is formed in the whole surface of the flexible substrate 52 which consists of polyester material. And direct attachment of the side by which the distortion sensing elements 53 and 54 are not formed in the top face of the bases 51b and 51c where some such flexible substrates 52 have been arranged at the include angle of 90 degrees is carried out with adhesives, and it is in the condition of one distortion sensing element 53 having been located on base 51b, and the distortion sensing element 54 of another side having been located on base 51c, and having been attached.

[0004] And if the distortion sensing element 53 arranged on base 51b is also extended, and resistance becomes high and control unit 51a is pushed down on X 2-way, while bending in the direction in which the top face of base 51b is extended, if actuation of such an input unit pushes down a in the control unit 51 of operating member 51 X1 direction, while bending in the direction whose base 51b top face cringes, the distortion sensing element 53 arranged on substrate 51b is also shrunk, and resistance becomes low. Moreover, if a is pushed down in the Y control unit 51 direction, the resistance of the distortion sensing element 54 will become high by the same principle as the above, and further, if it pushes down on Y 2-way, the resistance of the distortion sensing element 54 will become low. And the resistance value change mentioned above is detected as an electrical-potential-difference value change, a computer reads an electrical-potential-difference value change, and cursor is controlled so that a motion of X1 and X2 of control unit 51a, or Y1 and Y2 turns into the upper and lower sides of cursor, and movement toward right and left.

[0005]

[Problem(s) to be Solved by the Invention] Since the bases [of an operating member 51 / 51b, 51c, and 51d] whole underside surface is

contacted by the frame 50 and laid in it, the conventional input unit has few amounts of bending of Bases 51b and 51c, and has the problem that operability is bad. By moreover, the relation to which Bases [51b, 51c, and 51d] die length is restricted by regulation of the attaching position to a frame 50 since a bases [which are established in an operating member 51 / 51b, 51c, and 51d] point is attached in a frame 50 The die length of Bases 51b and 51c differs, for this reason, the amounts of bending of the bases 51b and 51c when pushing down control unit 51a the degree of fixed angle differ, big gap arises in the change in resistance of the distortion sensing elements 53 and 54, and there is a problem that what has a good precision is not obtained. Moreover, since the Bases [51b 51c, and 51d] whole underside surface is attached in a frame 50, when the key of a keyboard is operated, a key stroke influences Bases 51b, 51c, and 51d, and there is a problem that cursor moves. moreover, since Bases 51b and 51c are the configurations that the amount of [of control unit 51a] root headquarters tied mutually, and it was connected in section 51e, when control unit 51a is pushed down on X1 and X 2-way When control unit 51a is pushed down on Y1 and Y 2-way through connector section 51e again at base 51c, effect is received in base 51b through connector section 51e, and the problem of producing a big change in resistance is in the distortion sensing element of the partner who does not need a resistance value change by this.

[0006]

[Means for Solving the Problem] The plate-like substrate member by which said control unit was attached in the control unit and the core as 1st solution means for solving the above-mentioned technical problem, It has the distortion sensing element installed in this substrate member, and the plate-like mounting member which attaches said substrate member. Said substrate member Two or more beam sections which were prolonged in the direction of a right angle to the axis of said control unit, and were arranged with the include angle of 90 degrees, It has the connection section which connects between said adjacent ****, and said distortion sensing element is arranged in said ****. To said mounting member It received in the location corresponding to said connection section, it left the section, a hole or the hollow section which consists of a crevice was prepared in the location corresponding to said ****, and said **** was located in said hollow section, and where an opening is given to the lower part of said ****, it considered as the configuration which fixed said connection section in said receptacle section. Moreover, it considered as the configuration which arranged said **** in the shape of a cross joint as 2nd solution means. Moreover,

it considered as the configuration which prepared the hole in the part surrounded between said **** which adjoins said substrate member, and said connection section as 3rd solution means. Moreover, as 4th solution means, said substrate member was formed by ceramic material, and it considered as the configuration which fixed the conductor prepared in the lower part of said substrate member, and said mounting member by soldering. Moreover, as 5th solution means, said substrate member and the mounting member were formed with the metal plate, and said substrate member and said mounting member were considered as the configuration which fixed by spot welding. Moreover, as 6th solution means, while forming said substrate member by ceramic material, the flexible substrate which has an electric conduction line in the lower part of said substrate member was arranged, and where said electric conduction line is connected to said distortion sensing element prepared in the underside of said substrate member, it considered as the configuration which pinched said flexible substrate by said substrate member and said mounting member. Moreover, the bendable presser-foot section was prepared in said receptacle section of said mounting member as 7th solution means, and it considered as the configuration which fixed the connection section of said substrate member in said receptacle section by this presser-foot section. Moreover, as 8th solution means, the eyelet section was prepared in said receptacle section of said mounting member, and it considered as the configuration which fixed the connection section of said substrate member in said receptacle section by this eyelet section.

[0007]

[Embodiment of the Invention] Next, when the 1st example of the input unit of this invention is explained based on drawing 1 - drawing 5 , it is the perspective view as which all started the input unit of the 1st example of this invention, a sectional view [in / drawing 1 and / in drawing 2 / two to 2 line of drawing 1], a sectional view [in / in drawing 3 / three to 3 line of drawing 1], and drawing 4 looked at the decomposition perspective view, and drawing 5 R> 5 looked at the substrate member from the rear face. [the top view]

[0008] If the input device using the distortion sensing element of this invention is explained based on drawing 1 - drawing 5 , the tie-down plate 1 which consists of a metal plate with comparatively thick board thickness, and constitutes the frame of a keyboard etc. has prepared tongue-shaped piece 1a by which the lifting was cut and carried out and in which two or more bendings are possible. A prismatic form or cylindrical ** of the control unit 2 which has the flexibility it is

inflexible from the cast of synthetic resin or the synthetic resin containing a glass fiber (denaturation polyphenylene ether etc.) is cylindrical or cylindrical, and it is constituted. The substrate member K which consists of ceramic material of 8 corniform The mounting section 3 prepared in the core as shown in drawing 4 and drawing 5 , and two or more beam sections 4a, 4b, 4c, and 4d prolonged in the shape of a cross joint at the include angle of 90 degrees from this mounting section 3, It is prepared in the connection section 5 connected with each these beam sections [4a, 4b, 4c, and 4d] adjacent other end, and the corner of the mounting section 3, and has the hole 6 of the shape of a triangle which divides for the beam sections 4a, 4b, and 4c and 4d into the part surrounded between adjacent beam sections 4a, 4b, 4c, and 4d and connection sections 5. And in the mounting section 3 of the substrate member K, the lower part of a control unit 2 fixes with adhesives etc., consequently the beam sections 4a, 4b, 4c, and 4d have become what was prolonged in the direction of a right angle to the axis of the actuation shaft 3 at it.

[0009] It is based on falling and the beam sections 4a, 4b, 4c, and 4d of the substrate member K bend. moreover, a control unit 2 is shown in drawing 1 -- as -- arrow heads X1, X2, and Y1 and Y 2-way -- it can push down -- this -- Each beam section can bend without influencing the adjacent beam section mutually, when a control unit 2 is pushed down by existence of the beam sections 4a, 4b, and 4c and the hole 6 prepared in 4d, while the underside side is prolonged, being shrunken or coming to carry out. moreover, in an each **** [4a 4b, 4c, and 4d] underside While the distortion sensing elements 7a, 7b, 7c, and 7d which consist of a cermet resistor etc. are formed, in the underside of each connection section 5 Although the conductive conductor 8 in which soldering is possible is formed and not being illustrated here, each distortion sensing elements [7a, 7b, 7c, and 7d] both ends and a conductor 8 are connected by the electric conduction line (not shown) which consists of a silver paste etc. In addition, although it is what used four distortion sensing elements 7a, 7b, 7c, and 7d and being explained in the above-mentioned example, two distortion sensing elements 7a and 7c may be used. And as shown in drawing 3 , except for the conductor 8, it has the distortion sensing elements 7a, 7b, 7c, and 7d and composition with which the electric conduction line was covered with the insulating resist 9.

[0010] Moreover, especially the plate-like mounting member 10 that consists of a metal plate has the hollow section 11 which consists of a hole of the shape of a cross joint prepared in the core, or a crevice,

the receptacle section 12 located between the adjacent hollow sections 11, and the extension section 13 which extended to the method of outside, as shown in drawing 4 . That is, it has the composition that the hollow section 11 which leaves the receptacle section 12 to the mounting member 10, and becomes it from a hole or a crevice was formed. Moreover, an insulating layer 14 is formed in the front face of the top face of the mounting member 10, on this insulating layer 14, it is located on the edge of the extension section 13, and two or more drawer terminal areas 15 which consist of electric conduction material, the polar zone 16 which is located on the receptacle section 12 and consists of electric conduction material, and the path cord 17 which pulls out with this polar zone 16 and connects a terminal area 15 are formed.

[0011] And while the substrate member K lays the connection section 5 on the receptacle section 12 of the mounting member 10, a conductor 8 and the polar zone 16 are soldered with cream solder etc., and the substrate member K is attached in the mounting member 10. When the substrate member K is attached, and the beam sections 4a, 4b, 4c, and 4d While being located in the hollow section 11, being in the condition of having given the opening to the beam sections [4a, 4b, 4c, and 4d] lower part and the beam sections [by the control unit 2 / 4a, 4b, 4c, and 4d] amount of bending becoming large By the connection and fixing by the conductor 8 and the solder of the polar zone 16, the distortion sensing elements 7a, 7b, 7c, and 7d are pulled out through a path cord 17, are pulled out by the terminal area 15, and are in the condition. Moreover, the flexible substrate 18 has an electric conduction line (not shown) in that lower part, and performs the drawer to the outside of an input unit by pulling out this electric conduction line and carrying out soldering to a terminal area 15. And as shown in drawing 1 - drawing 3 , the input device constituted in this way lays the mounting member 10 on the tie-down plate 1 of a keyboard, bends tongue-shaped piece 1a on the mounting member 10, and is attached in the tie-down plate 1 by tongue-shaped piece 1a. In addition, you may make it the mounting member 10 make a tie-down plate 1 serve a double purpose in this 1st example.

[0012] And if actuation of such an input unit pushes down two in the control unit X1 direction, while the underside of beam section 4a will bend in the shrunken direction If the resistance of distortion sensing element 7b of the underside of beam section 4b increases and a control unit 2 is further pushed down on X 2-way while the resistance of distortion sensing element 7a of the underside of beam section 4a decreases since the underside of beam section 4b bends in the extended direction Since the underside of beam section 4b bends in the shrunken

direction while the underside of beam section 4a bends in the extended direction, While the resistance of distortion sensing element 7a of the underside of beam section 4a increases, the resistance of distortion sensing element 7b of the underside of beam section 4b decreases, and by this, among the distortion sensing elements 7a and 7b, an electrical-potential-difference difference arises and it comes to move the cursor of X shaft orientations.

[0013] Moreover, if two is pushed down in the Y control unit 1 direction, while the underside of beam section 4c will bend in the shrunken direction If the resistance of 7d of distortion sensing elements of the underside of 4d of beam sections increases and a control unit 2 is further pushed down on Y 2-way while the resistance of distortion sensing element 7c of the underside of beam section 4c decreases since the underside of 4d of beam sections bends in the extended direction Since the underside of 4d of beam sections bends in the shrunken direction while the underside of beam section 4c bends in the extended direction, While the resistance of distortion sensing element 7c of the underside of beam section 4c increases, the resistance of 7d of distortion sensing elements of the underside of 4d of beam sections decreases, and by this, among the distortion sensing elements 7c and 7d, an electrical-potential-difference difference arises and it comes to move the cursor of Y shaft orientations.

[0014] Drawing 6 shows the 3rd example of the input unit of this invention. Moreover, this example The substrate member K is formed with a metal plate. In the front face of this substrate member K The insulating layer 19 is formed. On this insulating layer 19 The distortion sensing elements 7a, 7b, 7c, and 7d formed in the beam sections [4a, 4b, 4c, and 4d] location, respectively, It has the electric conduction line 22 formed so that two or more drawer terminal areas 21 formed in the location of the drawer section 20, the drawer terminal area 20, and the distortion sensing elements 7a, 7b, 7c, and 7d might be connected. Moreover, while a control unit 2 fixes to hole 3a of the mounting section 3, the connection section 5 of the substrate member K has fixed the connection section 12 and the mounting member 10 by spot welding in the condition of having been laid in the receptacle section 12 of the mounting member 10. Moreover, the flexible substrate 18 has an electric conduction line (not shown) in that lower part, and performs the drawer to the outside of an input unit by pulling out this electric conduction line and carrying out soldering to a terminal area 21. Since other configurations are the same as that of said 1st example, they give the same number to the same components, and omit the explanation here.

In addition, you may make it the mounting member 10 make a tie-down plate 1 serve a double purpose also in this 2nd example.

[0015] Drawing 7 shows the 3rd example of this invention. Moreover, this example On the beam sections [of the substrate member K which consists of ceramic material / 4a, 4b, 4c, and 4d] underside, respectively Distortion sensing element 7a, Where the electric conduction line (not shown) which prepared 7b, 7c, and 7d, and was formed in the flexible substrate 23 is connected to the distortion sensing elements 7a, 7b, 7c, and 7d, this flexible substrate 23 is pasted up on the underside of the substrate member K, the flexible substrate 23 is pulled out, and it is making with the section. In moreover, the condition of the presser-foot section 24 bent at the edge of the receptacle section 12 having been formed in the mounting member 10 which consists of a metal plate, having received the connection section 5 of the substrate member K, and having laid on the section 12 The presser-foot section 24 is inserted in the hole 6 of the hole 23a and the substrate member K of the shape of a triangle prepared in the flexible substrate 23, the presser-foot section 24 is bent and carried out, the connection section 5 is forced on the mounting member 10 in the presser-foot section 24, and the substrate member K is attached in the mounting member 10. Since other configurations are the same as that of said 1st example, they give the same number to the same components, and omit the explanation here. In addition, you may make it the mounting member 10 make a tie-down plate 1 serve a double purpose also in this 3rd example.

[0016] Drawing 8 and drawing 9 show the 4th example of this invention. Moreover, this example While forming the distortion sensing elements 7a, 7b, 7c, and 7d in a beam sections [of the substrate member K which consists of ceramic material / 4a, 4b, 4c and 4d] underside like said 3rd example, respectively Where the electric conduction line (not shown) formed in the flexible substrate 23 is connected to the distortion sensing elements 7a, 7b, 7c, and 7d, this flexible substrate 23 is pasted up on the underside of the substrate member K, the flexible substrate 23 is pulled out, and it is making with the section. In moreover, the condition of the eyelet section 25 having been formed in the receptacle section 12 by spinning, having received the connection section 5 of the substrate member K in the mounting member 10 which consists of a metal plate, and having laid on the section 12 The eyelet section 25 is inserted in round hole 23a prepared in the flexible substrate 23, and hole 5a prepared in the connection section 5 of the substrate member K, the connection section 5 is forced on the mounting member 10 for the point of the eyelet section 25 in caulking ** and the

eyelet section 25, and the substrate member K is attached in the mounting member 10. Since other configurations are the same as that of said 1st example, they give the same number to the same components, and omit the explanation here. In addition, you may make it the mounting member 10 make a tie-down plate 1 serve a double purpose also in this 4th example.

[0017]

[Effect of the Invention] In the input unit of this invention, the beam sections 7a-7d are located in the hollow section 11 of the mounting member 10, and since the substrate member K is the configuration attached where an opening is given to the beam sections [7a-7d] lower part, it can enlarge the beam sections [by the control unit 2 / 4a-4d] amount of bending, can enlarge distortion sensing elements [7a-7d] variation, and can offer the good input unit of operability. Moreover, since an opening is in the beam sections [7a-7d] lower part, the key stroke when operating a keyboard is not influenced by the beam sections 7a-7d, but an input unit without if cursor moves at the time of a key stroke can be offered. Moreover, since it is the configuration which the connection section 5 of the substrate member K fixes in the receptacle section 12 of the mounting member 10, the attaching position of the substrate member K can be fixed, a distortion sensing elements [when pushing down a predetermined include angle for a control unit 2 / 7a-7d] change in resistance can be fixed, and an input unit with a good precision can be offered as compared with the former. Being able to choose the two beam sections arranged in 90 degrees by arranging the beam sections 4a-4d in the shape of a cross joint, being able to prepare a distortion sensing element, and obtaining the degree of freedom of a design moreover, with **** Furthermore, to the beam sections 4a-4d, four distortion sensing elements 7a-7d can also be formed, the substrate member K which can carry out [****]-izing to various products can be offered, and an input unit with good productivity can be offered.

[0018] Moreover, since a hole 6 is formed in the part surrounded between the beam sections 4a-4d and the connection sections 5 which adjoin the substrate member K and it is a thing, When the distortion sensing elements 7a-7d push down on a these beam sections [4a-4d] top face by existence of a hole 6 at a control unit 2X1 and X 2-way, on it The resistance of only the distortion sensing element which does not affect the beam sections 4a and 4b again when it pushes down on Y1 and Y 2-way, therefore wants to change to the beam sections 4c and 4d can be changed, and an input unit with a good precision can be offered. Moreover, by forming the substrate member K by ceramic material, and carrying out

soldering of the conductor 8 prepared in the lower part of the substrate member K to the mounting member 10, mounting and electrical installation of the substrate member K can be made simultaneous, and productivity is good and can offer a cheap input unit. Moreover, by forming the substrate member K and the mounting member 10 with a metal plate, and fixing both by spot welding, firm mounting can be performed, and endurance is good and can offer a long lasting input unit.

[0019] Moreover, since the flexible substrate 23 was pinched by the substrate member K and the mounting member 10, mounting of the flexible substrate 23 becomes firm, there is no peeling of the flexible substrate 23 at the time of external connection, and the reliable input unit of an external connection activity can be offered. Moreover, in the presser-foot section 24 prepared in the receptacle section 12 of the mounting member 10, since the connection section 6 of the substrate member K was pressed down, the configuration is easy, is cheap and can offer an input unit with good productivity. Moreover, in the eyelet section 25 prepared in the receptacle section 12 of the mounting member 10, since the connection section 6 of the substrate member K was pressed down, the configuration is easy, is cheap and can offer an input unit with good productivity.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The top view concerning the 1st example of the input unit of this invention.

[Drawing 2] The sectional view in two to 2 line of drawing 1 .

[Drawing 3] The sectional view in three to 3 line of drawing 1 .

[Drawing 4] The decomposition perspective view concerning the 1st

example of the input unit of this invention.

[Drawing 5] The perspective view which looked at the substrate member concerning the 1st example of the input unit of this invention from the rear face.

[Drawing 6] The decomposition perspective view showing the 2nd example of the input unit of this invention.

[Drawing 7] The decomposition perspective view showing the 3rd example of the input unit of this invention.

[Drawing 8] The decomposition perspective view showing the 4th example of the input unit of this invention.

[Drawing 9] The sectional view in nine to 9 line of drawing 8 .

[Drawing 10] The perspective view of the conventional input unit.

[Description of Notations]

1 Tie-down Plate

1a Tongue-shaped piece

2 Control Unit

K Substrate member

3 Mounting Section

3a Hole

4a Beam section

4b Beam section

4c Beam section

4d Beam section

5 Connection Section

5a Hole

6 Hole

7a Distortion sensing element

7b Distortion sensing element

7c Distortion sensing element

7d Distortion sensing element

8 Conductor

9 Resist

10 Mounting Member

11 Hollow Section

12 Receptacle Section

13 Extension Section

14 Insulating Layer

15 Drawer Terminal Area

16 Polar Zone

17 Connection

18 Flexible Substrate

19 Insulating Layer
20 Drawer Section
21 Drawer Terminal Area
22 Electric Conduction Line
23 Flexible Substrate
23a Hole
24 Presser-Foot Section
25 Eyelet Section

[Translation done.]

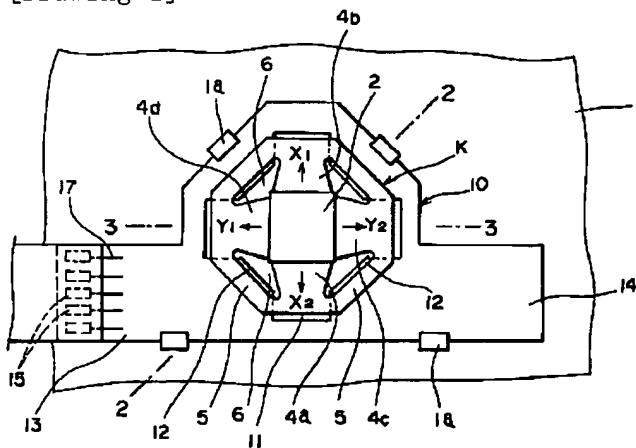
* NOTICES *

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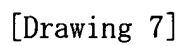
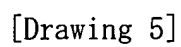
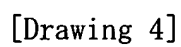
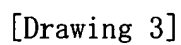
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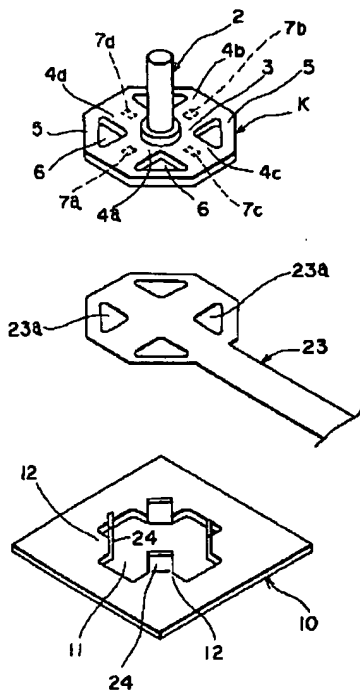
DRAWINGS

[Drawing 1]

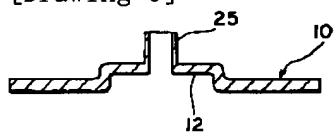


[Drawing 2]

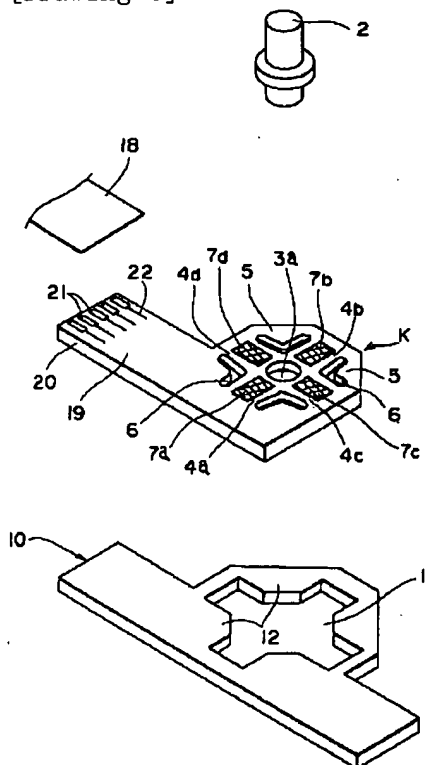




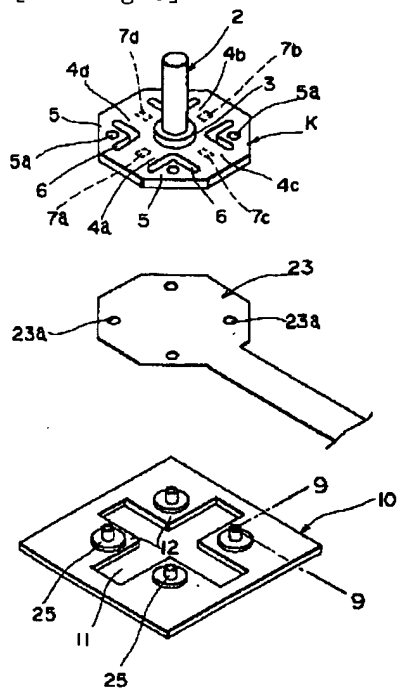
[Drawing 9]



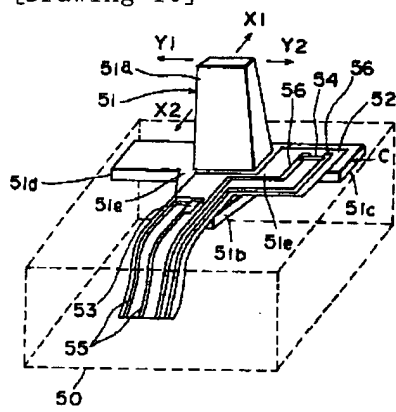
[Drawing 6]



[Drawing 8]



[Drawing 10]



[Translation done.]